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sure that the lines were really ruled to the fineness claimed. He would like to hear from Mr. Fasoldt.

Mr. E. C. Fasoldt said, That the closeness to which the lines were ruled was settled by the graduation on their ruling machine, and could also be shown by a delicate pair of counting micrometers for stage and for eye-piece that they had constructed. He was assured by Dr. Woodward that the standard meter used when they constructed their ruling machine was now known to be slightly in error, so that the millimeter used was a little short, and therefore on this nineteenth band there were *more* than 152,000 lines to the inch. [Laughter and applause]

“EFFECTS OF DIVISION OF THE VAGI OF THE HEART,” by Dr. Bleile and A. Feiel (Page 91).

Dr. Geo. E. Fell said, The paper was one he desired to commend. It was a step in the right direction. The changes produced in tissues through sections of the nerves which control them, is an important subject for consideration. In the starting point of pathology, a defect in nerve nutrition or action may frequently produce the lesion—Dr. Bleile’s experiment may simulate, in effect, abnormal conditions, and he hoped they would be followed up by the authors and by other members.

Dr. Krackowizer said, The paper was exceedingly interesting, and, happily, so free from abstruse technicalities as to be followed by others than specialists in their particular line of work. Does Prof. Bleile say, that in the case of those animals which did not die of inanition he discards entirely the theory of degradation of tissue? Or does he assume that the cutting of both vagi would produce a total degeneration of tissue?

Dr. Bleile.—No. In the experiments of Eichorst, all on pigeons, total degeneration was produced. We experimented only on rabbits; not on invertebrates. Our rabbits all survived, apparently for an indefinite time, one living thirty-two days, and dying then by accident. The change comes on after one day’s division of both vagi, though evidently not so marked as Eichorst says. After the lapse of seven days the granules are probably fatty.

Dr. W. C. Barrett said, This question was one of absorbing interest to every medical man. The great type of disease at the

present day in America is neural. Most pathological lesions arise from neural complications. We greatly need increased and exact knowledge in regard to the real laws of nerve action. We can only gain such knowledge through microscopic vivisection and dissection of the lower animals, or at least chiefly so. He had often divided the Pneumo-gastric nerve himself in pursuit of such knowledge, but had never made the special study of the heart substance in connection therewith, as has been done by the author of the paper, his studies leading him in a different direction. But that such disintegration of tissue as has been described must result from such destruction of nerves, ought to be evident to everyone who reflects that the preservation of the histological structure and anatomical elements of the tissues must depend on the neural currents. And the study of these neural currents ought to be the all-absorbing aim of every medical microscopist of the present day. Much of the study of nerve disease has been almost in vain, proceeding in a wrong direction. The idea has been held that the nerve force which finds its way along the nerve fibers is something substantial and special; a material entity, instead of being only one form of manifestation of that great unit of force which we see manifesting itself elsewhere as electricity, chemism, &c. An electric current can be sent along the nerves, and almost all the effects of life produced.

Now, if an artery, other than a great trunk artery, be severed, the parts supplied by it do not atrophy, for the other collateral arteries carry on the circulation. So if a nerve, other than one of the great trunk nerves, be divided, the circulation of those neural currents on which the life and growth of the tissue depends, just as truly as it depends on the arterial blood, will be carried on by the collateral nerves, and so it happens that the tissue suffers no great change; while if a nerve-trunk be divided, there are no other nerves capable of transmitting its currents, and so the tissue degenerates, as has been described. My own studies go to show that the collateral nerve circulation is fully as important as that of the arteries.

Dr. Lucy said, The question may be asked, do the disturbances arise from the injury to the nerve itself, or from the nervous current being interfered with ?

Dr. Bleile said, That in his experiments the nerve was divided so that nothing could come from the nerve-centers.

Prof. Stowell said, These studies are of interest, not only as to the nerves but as to the muscles also. There is in them a hint that if these granules take the place of the striations in the heart-muscle in imperfect nervation, we may yet find it necessary to revise our theory of the true ultimate structure of all muscle, and I move that Dr. Bleile be specially requested by vote of this Society to continue his most valuable studies in this direction, and report his progress another year.

The President put the motion and it was carried.

Dr. Thomas Taylor said, The question as to whether the granules described were fat or something else, is important. It can be settled easily by the use of sulphuric acid. This acid acts at once on fat or oily matter, and its action can be followed with ease on the slide.

Prof. S. H. Gage asked, Where do you cut the vagi?

Dr. Bleile.—In the neck; no special point, except that it is below the larynx—between the larynx and the clavicle. There are no ganglia. In answer to other questions from Prof. Gage, Dr. Bleile said, The vagus and the sympathetic system have no connection in the rabbit, though it may have a large connection in some animals. The heart is affected on both sides by this degeneration when only one vagus is cut,—almost the same on both sides. Any irritation of the vagus would sometimes cause stoppage of the heart. The heart has inherent nerve power, and it is possible that the vagus, simply by its action, touches off or sets going something; he could not say what. He had no pet theory on the subject. The collateral current coming down by the other vagus, when only one is cut, does affect the heart undoubtedly. The effect is certainly different when both vagi are cut. I believe the granules to be fat because they plainly take a stain from osmic acid; and second, because they stain from Bismarck brown, and this is well known as a selective stain for fat.

Prof. S. H. Gage said, Another stain, which would serve to differentiate, was chinoline; and, in a question so important, we should

use every possible inquiry, and so exhaust every avenue of approach, and reach the final result as a fact.

Dr. Bleile, in answer to a question from Dr. Taylor, said that the vagi do not seem to serve as brakes on the action of the sympathetic nerves on the heart. Their action or influence will cease after a term, and after the first shock is over, the heart will go on beating for a time after they are cut.

“THE TERMINATION OF THE NERVES IN THE LIVER,” by M. L. Holbrook (Page 95.)

Dr. W. C. Barrétt said, That he believed nerve-tissue to be a simple differentiation of that fundamental substance of which all the rest of the body is made. The ultimate termination of several of the nerves is as yet unknown, and we cannot hope to fully find out this great secret until we first settle more clearly what is the real nature of nerve-force. When we settle it that the nerve-force is nothing more or less than the resultant of the molecular changes which are constantly going on in the nerve, as in the other tissues, we will then be in a condition to realize what we must look for in searching for the nerve termini. Reference has been already made to the action of the heart after its severance from the other tissues, its rhythmic systole and diastole still going on. This is easy to understand, if we bear in mind this view of nerve-force. Just so long as molecular changes can take place in the heart, and in the nerve-lines by which it is ordinarily connected with the rest of the body, just so long will nerve action and muscular activity, resulting therefrom, take place. Just as in the electric battery, so long as the acids and plates are in contact, and their chemism for each other not saturated, will there be currents generated. So in the whole body, so long as molecular changes can go on in the ordinary vital functions, so long may we have nervous and muscular activity. Some animals can transform some of this common bodily force into very manifest electric force, as the *Gymnotus*, or electric eel. Now, whenever we can work out the real connection between nerve-force and the other physical forces, electric-force especially, we shall be in a much better condition to enter upon the inquiry proposed in this most interesting paper. Much